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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/050,866	01/18/2002	Kiyoshi Yoshizumi	218209US3	9246

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EXAMINER

HODGE, ROBERT W

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 03/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/050,866

Applicant(s)

YOSHIZUMI ET AL.

Examiner

Robert Hodge

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 24-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/28/02 & 4/18/02</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Applicants' Election

1. The Examiner acknowledges the applicants' election of claim group I claims 1-23 with traverse. And that claim group II, claims 24-30 are non-elected and are withdrawn from consideration. In response to the Applicants' argument that searching all claims in the instant case would not cause an undue burden to the examiner. The examiner disagrees, because claim group I is drawn to a fuel cell system, but claim group II is drawn to a method of discharging hydrogen off-gas which does not necessarily have to involve a fuel cell and could be used for any number of applications where hydrogen is produced and needs to be vented to the atmosphere such as in electrolyzers and reformers. Therefore since a fuel cell is not necessarily required in the method it would require searching outside of class 429 to find a method for discharging hydrogen.

Claim Language

2. Applicants are put on notice that claim language for claiming an apparatus must provide structure for the apparatus that the applicants deem to be their invention. In the instant application the claim language of claims 1-23 does provide structure but also provides process steps as well as intended use statements. The examiner notes that little to no patentable weight has been given to the claim language, which provides a process step or is a statement of intended use. The examiner further notes that the applicants have claimed a method in non-elected claims 24-30, so it is unnecessary to claim process steps in apparatus claims when the process is already being claimed in a

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separate set of claims. In light of the above statements the examiner has examined claims 1-23 in as much as the structure of the apparatus has been claimed and as long as the structure of the prior art can perform the same function it will read on the claims as so recited. It is also noted that the recitation "an onboard fuel cell system" does not imply anything more than a typical fuel cell system since no recitation is made to what the fuel cell system is onboard, it could be onboard anything, which would also include stationary applications.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-2 and 5 are rejected under 35 U.S.C. 102(b) as being unpatentable by Boneberg et al. WO 00/45456 (U.S. Patent No. 6,696,188 is used as the English translation) hereinafter Boneberg et al.

5. Boneberg et al. teaches a fuel cell system being supplied with hydrogen and oxygen gases, which in turn generates electric power (column 3, lines 10-15) then mixing the exhaust gas streams from a fuel cell (figure 1 and column 5, lines 1-3) and

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combusting the mixture catalytically (column 2, line 15 and column 4, line 2) and then venting the combustion product to the atmosphere thus having a reduced hydrogen content (figure 1 and column 5, line 3). The examiner notes that although the Boneberg et al. reference does not explicitly disclose a fuel cell system being fed hydrogen and oxygen gases, it does disclose that a preheated methanol/water mixture in gaseous form is fed to a gas generator, which is for the purpose of generating hydrogen (as disclosed in column 1, lines 10 et seq.) and because of this disclosure it is inherent that hydrogen and oxygen gas are fed to a fuel cell installation. It is also inherent that electric power will be generated by feeding a fuel cell hydrogen and oxygen gases, since this is the purpose of a fuel cell (this inherency statement applies to all proceeding rejections). Otherwise there would be no anode and cathode exhaust gases to be further reacted or used for preheating purposes in the system disclosed by Boneberg et al. The examiner further notes that the Boneberg et al. reference teaches that in a preferred embodiment a non-catalytic combustor would be preferred, however it still teaches the use of a catalytic combustor which is well known in the art, therefore it still reads on the claims as so recited.

6. Claims 1-3 and 5-6 are rejected under 35 U.S.C. 102(e) as being unpatentable by Salvador et al. U.S. Patent No 6,815,106 hereinafter Salvador et al.

7. Salvador et al. teaches that it is well known to use fuel cells in vehicular applications (column 2, line 9) and also teaches a fuel cell system that is fed hydrogen and oxygen gas for the purpose of generating electric power wherein the exhaust gases of the fuel cell are mixed in a combustor and are reacted to reduce the amount of

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hydrogen and vented to the atmosphere (figure 1 and column 4, lines 23 et seq.).

Salvador et al. further teaches the use of a pressure-loss member in the cathode exhaust line (column 3, lines 5-7) as well as the use of condensers to remove water from the gas streams (column 4, lines 46-47 and figure 1). The examiner notes that even though the Salvador et al. reference does not disclose that the exhaust streams are mixed before entering the combustor, the streams are still mixed within the combustor and then reacted, therefore it reads on the claims as so recited. Especially since claim 5 recites "a catalytic reaction portion which is disposed in the mixing portion...", therefore according to the claim language the mixing portion can be one in the same as the combustor (the above statement applies to all proceeding rejections).

8. Claims 1-2 and 5-6 are rejected under 35 U.S.C. 102(e) as being unpatentable by Borup et al. U.S. Patent No. 6,521,204 hereinafter Borup et al.

9. Borup et al. teaches that fuel cells may be used in vehicular applications (column 1, line 53) and a fuel cell system being provided with hydrogen and oxygen for the purpose of generating electric power as well as mixing the exhaust gases of the fuel cell in a combustor and then removing excess water through a series of condensers and venting the resultant stream to the atmosphere (figure 1 and column 3, lines 37 et seq.).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Salvador et al. in view of Fuhrmann U.S. Patent No. 5,917,161 hereinafter Fuhrmann.
12. Salvador et al. teaches everything in the above 102 rejection.
13. Salvador et al. does not teach that a pressure-loss member is a muffler.
14. Fuhrmann teaches that a muffler has a pressure loss (abstract).
15. Salvador et al. and Fuhrmann are analogous because they are from similar problem solving areas where and exhaust is being vented to the atmosphere and the sound created from the exhaust is reduced.
16. It would have been obvious to include in Salvador et al. the use of a muffler as provided by Fuhrmann as the pressure-loss member in order to reduce the sound output of the exhaust to make a safe decibel level for human hearing.
17. Claims 7-11, 13-15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salvador et al. in view of Joerissen et al. WO 00/63993 hereinafter Joerissen et al.
18. Salvador et al. teaches everything in the above 102 rejection as well as a hydrogen supply portion being supplied to the fuel cell (figure 1 and column 4, lines 23 et seq.) as well as a controller used for controlling various components of the system including a back pressure regulator, which in the instant case appears to be a pressure regulated valve (column 4, line 52).
19. Salvador et al. does not teach a valve used to block the flow of hydrogen to the mixing portion, recycling hydrogen exhaust to the fuel cell inlet, the use of a hydrogen

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occluding alloy tank for hydrogen storage, a pump to pump hydrogen exhaust to the fuel cell inlet or hydrogen from the tank, a flow rate-reducing portion or a gas-liquid separator used for just the cathode exhaust.

20. As per the provide German office action translation Joerissen et al. teaches "a fuel cell unit that is connected with a hydrogen storage device (in particular a metal hydride storage device) by means of a passage provided with a pressure reduction valve (re claims 8 and 9, cf. (2): claims 1 and 4., Fig. 1 with pertinent description). From the anode chamber outlet of the fuel cell, unreacted hydrogen is returned to the anode chamber inlet by means of a pump (re claim 10, cf. (2): claim 1; Fig. 1 and pertinent description). Via a further passage with a valve, hydrogen-containing anode off-gas can be discharged from the circular flow (re claim 7, cf. (2): claim 7; Fig. 1 with pertinent description). The passages for discharging anode and cathode off-gas are provided with condensed water separators (re claims 6 and 19, cf. (2): claims 7 and 8., Fig. 1 with pertinent description)."

21. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include all of the features of Joerissen et al. to improve Salvador et al.'s fuel cell system. The motivation for doing so would have been to provide a system that safely stores hydrogen and utilizes the supplied hydrogen to its fullest extent without waste. As well as adding a pump or flow rate-reducing portion to best control the supply of hydrogen to the fuel cell in order not to over load the fuel cell with too much pressure, but at the same time increasing the pressure when necessary. And adding a water separator to the cathode exhaust to remove all of the excess water that is formed during

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the reaction of hydrogen and oxygen in the fuel cell before entering the catalytic combustor to prevent it from being flooded and thus not being able to function.

22. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Salvador et al. and Joerissen et al. as applied to claim 7 above, and further in view of Borup et al. and Salvador et al.

23. Salvador et al. and Joerissen et al. teach everything in the above 102 and 103 rejections.

24. Salvador et al. and Joerissen et al. do not teach a flow rate-changing portion or a control portion.

25. Borup et al. teaches everything in the above 102 rejection as well as the use of a mass flow meter to control the amount of air entering the fuel cell system.

26. Salvador et al. teaches everything in the above 102 and 103 rejections as well as a controller used for controlling various components of the system.

27. At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the above references to add a mass flow meter, which is controlled by a controller to any of the fuel cell systems of the above disclosures. The motivation for doing so would be to regulate the amount of air that reaches the fuel cell in order to control the reaction of the fuel cell and thus control the amount of electric power output by the fuel cell, by a predetermined protocol set into the controller.

28. Claims 16-18 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salvador et al. in view of Heinen et al. DE 4219113 hereinafter Heinen et al.

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29. Salvador et al. teaches everything in the above 102 and 103 rejections.

30. Salvador et al. does not teach the use of a diffusion member or a shield member that is disposed at the exhaust to the atmosphere of the off-gasses, or that they be either meshed or punched porously.

31. As per the provided German office action translation Heinen et al. teaches "off-gas tubes provided in the outlet portion with twisting or mixing elements or baffle plates to prevent a straight flowing of the off-gases and to promote the mixing-through with the ambient air (re claims 16 to 18 and 21 to 23, cf. (4) claims 1 and 3; column 1, lines 50 to 54; Fig. 2 with pertinent description)". The examiner notes that the mixing elements or baffle plates as taught by Heinen et al. are equivalent to the diffusion member or shield member of the instant application since the claimed structure is not specific as to what the actual member really is. And since the disclosure of the Heinen et al. reference performs the same function as the instant application it reads on the claims as so recited.


32. Salvador et al. and Heinen et al. are analogous art because they are from similar problem solving area of exhausting off gasses from a system after a combustion reaction.

33. It would have been obvious to modify Salvador et al. to include a shield or diffusion member at the exhaust port in order to prevent a straight flowing of the off-gases and to promote the mixing-through with the ambient air.

34. Claim 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Salvador et al. in view of Forte et al. U.S. Patent No 6,630,260 hereinafter Forte et al.

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35. Salvador et al. teaches everything in the above 102 and 103 rejections.
36. Salvador et al. does not teach the use of a water-vapor exchanger in communication with the cathode inlet and outlet.
37. Forte et al. teaches a water transfer device for transferring water from the cathode effluent to the cathode inlet (column 4, lines 41-46).
38. It would have been obvious to include in Salvador et al. the use of a water transfer device as taught by Forte et al. in order to reuse the water created by the reaction of hydrogen and oxygen in the fuel cell to humidify the oxidant going into the fuel cell and thus prevent the membrane from drying out and ceasing to function.



MICHAEL BARR
SUPERVISORY PATENT EXAMINER

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert Hodge whose telephone number is (571) 272-2097. The examiner can normally be reached on 8:00am - 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).